

MATTEL ELECTRONICS™

LAS VEGAS PINBALL™ GAME

# SERVICE MANUAL



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# I. INTRODUCTION & ASSUMPTIONS

This Manual has been developed to help the technician to troubleshoot and fix the Mattel Electronics "Las Vegas" Pinball Machine.

It is to be used in conjunction with the Owner's Manual which covers Warranty Statement, Assembly, Consumer Adjustments and Troubleshooting, and Game Play.

## ASSUMPTIONS

It is assumed in this Manual that the logic board was once working well and has began malfunctioning during use. That is, that there are no shorts on the board.

It is assumed that the technician has power and all necessary tools required for repairing the machine, especially the following:

1. A high-impedance (20,000 ohms per volt or better) multi-meter for **all** continuity testing.

**Do not attempt any continuity testing using test lights, buzzers or similar devices, as permanent damage to the logic components will occur.**

2. Jumper wires with alligator clips at both ends.
3. Soldering iron.

## II. DISASSEMBLY

For troubleshooting of Playfield and Pit Boss Control Console with diagrams of Pit Boss Control Console, instruction overlay, Playfield, logic board, etc.

**CAUTION:** DO NOT ATTEMPT TO DISASSEMBLE THE LAS VEGAS PINBALL GAME WITHOUT FIRST DISCONNECTING THE POWER CORD FROM THE WALL OUTLET. SIMILARLY, TROUBLESHOOTING THE UNIT WHILE ENERGIZED SHOULD ONLY BE ATTEMPTED WHEN NO ALTERNATIVE EXISTS.

## REMOVAL OF PIT BOSS CONTROL CONSOLE

1. Remove 4 hex head screws. Lift off Pit Boss Control Console and let hang gently.
2. Remove glass.
3. Remove 4 rubber caps and remove instruction overlay.
4. Remove 4 Phillips-head screws on Playfield.
5. Lift bottom of Playfield and slide forward.
6. Disconnect connector C2 from logic board.
7. Raise Playfield and disconnect Tilt Switch.
8. Remove Pit Boss Control Console.

## DISASSEMBLY OF SCORE BOX

(See Owner's Manual)

## TROUBLESHOOTING/REPLACING PLAYFIELD COMPONENTS

1. Remove 4 hex head screws. Lift off Pit Boss Control Console and let hang gently.
2. Remove glass by carefully sliding out.
3. Remove 4 rubber caps and remove instruction panel.
4. Remove 4 Phillips-head screws on Playfield.
5. Lift Playfield and disconnect Flipper switch wires to Playfield.
6. Turn Playfield upside down and replace in Cabinet.  
**Do not tangle wires in switches or other assemblies.**

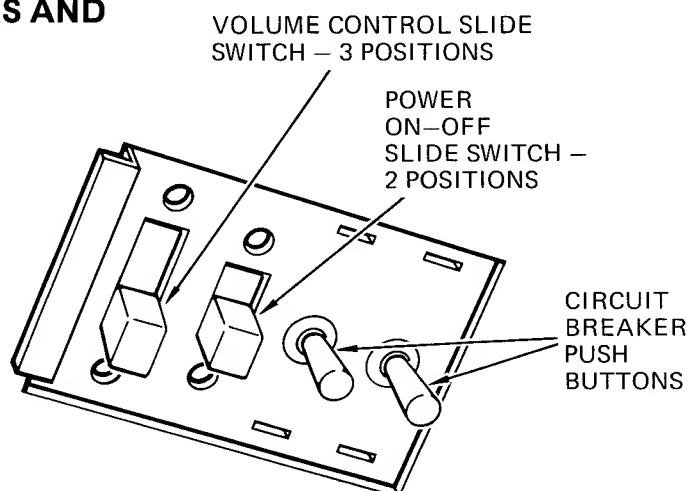
## III. POWER SUPPLY (MAIN)

The Power Supply consists of a dual secondary transformer. Two circuit breakers are used, one each to the two bridge rectifiers.

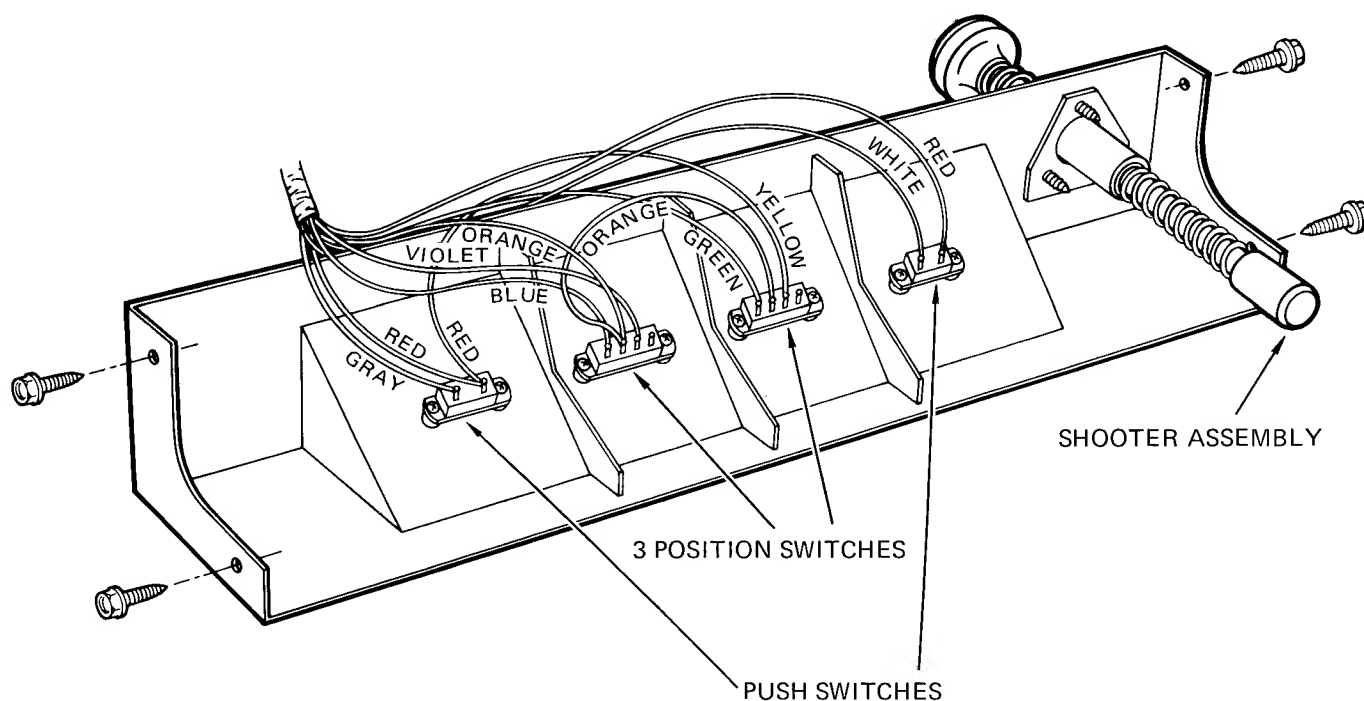
One secondary supplies power for the score display and solenoids. The other supplies power for the lamps, sound amplifier, and logic circuitry. The logic circuitry supply is regulated to -15 VDC.

Note: The system is powered by separate negative voltage power supplies and the common ground is the most positive point of each supply. All voltages are negative relative to the common ground.

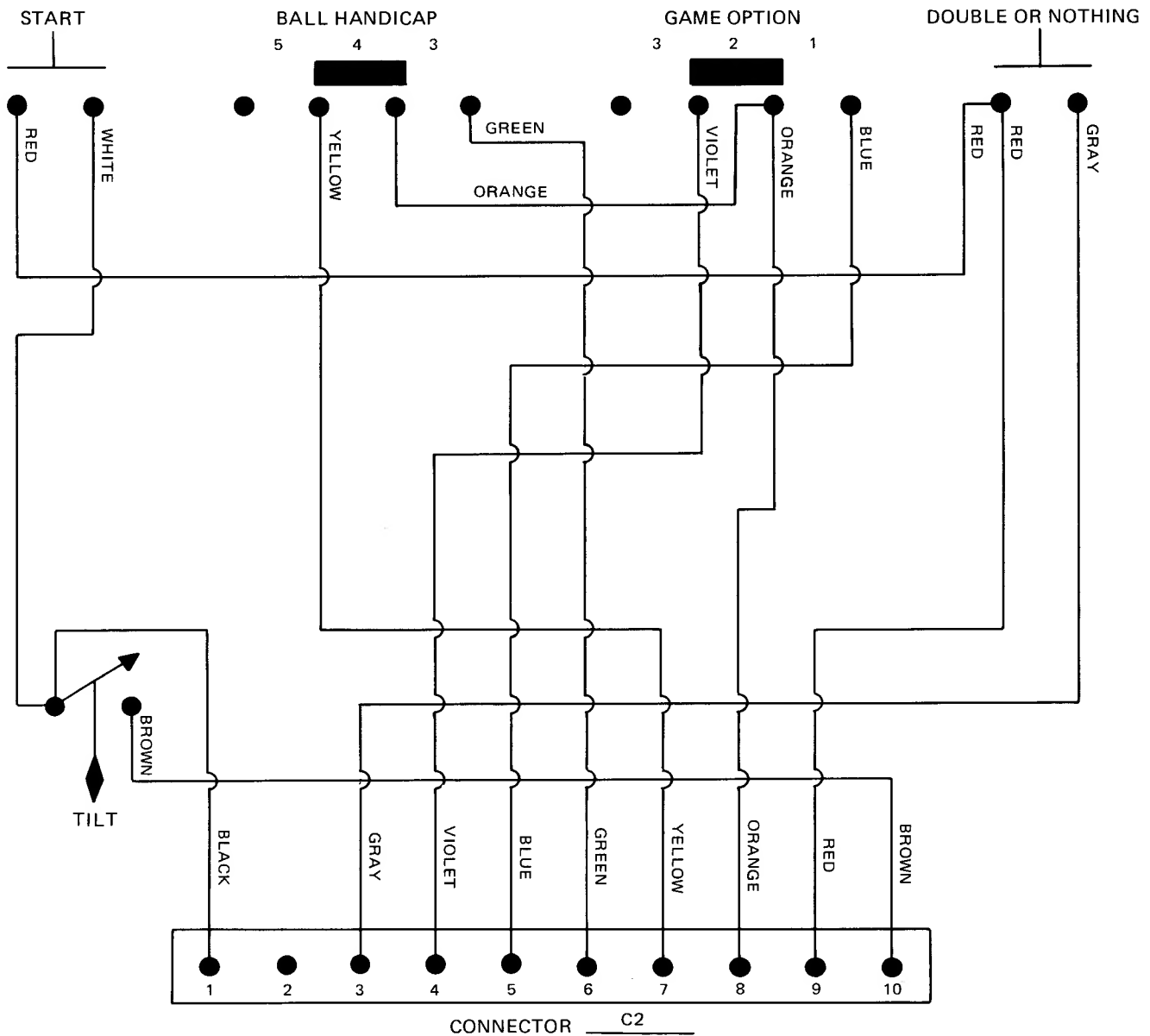
## CIRCUIT BREAKERS AND SWITCH PLATE



## PIT BOSS CONTROL CONSOLE



# IV. PIT BOSS AND TILT SCHEMATIC



PIT BOSS AND TILT

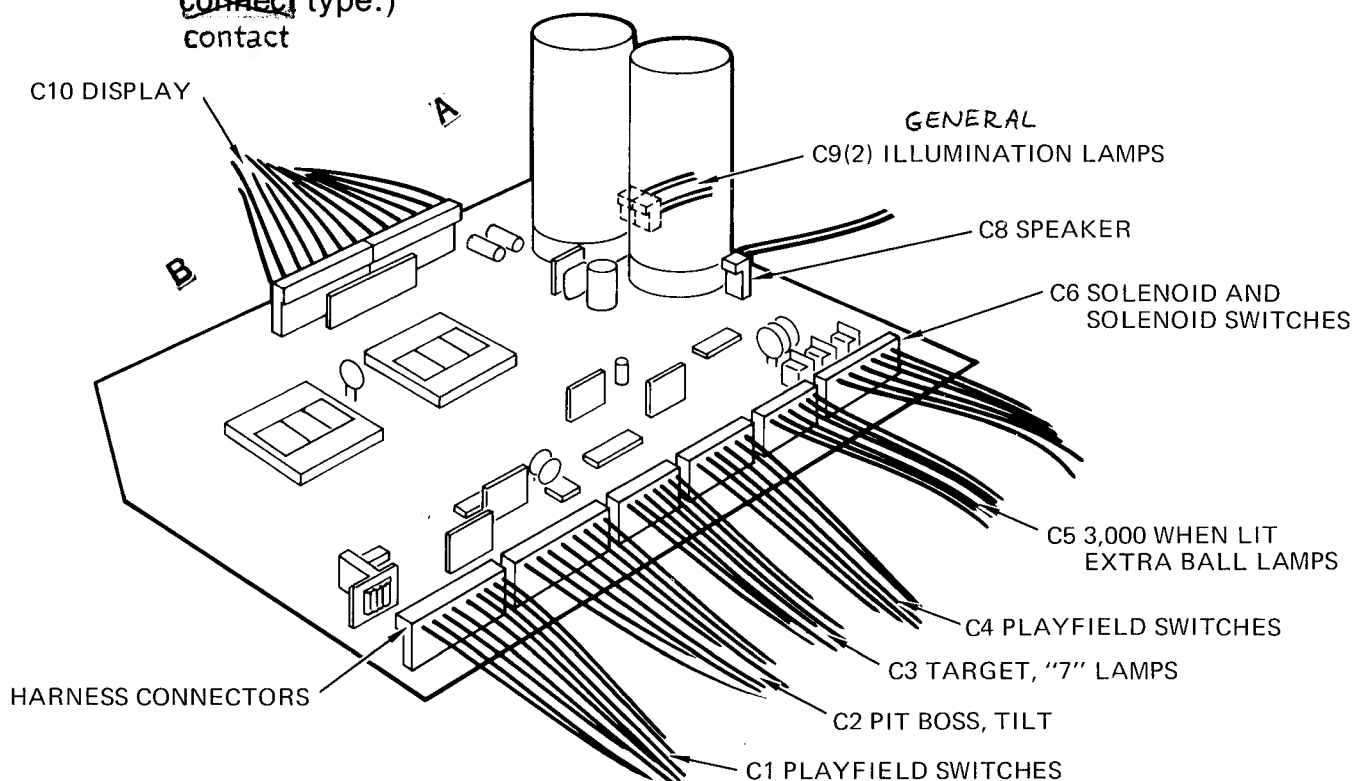
## V. SWITCH MATRIX

The Switch Matrix consists of low level switches feeding Schmitt triggers (IC 4584).

The switches in the Switch Matrix are fed by buffered logic signals coming from the processor. The buffering (and inversion) is accomplished by CMOS converters (IC 4069).

The ball-in-play and ball-return switches are not part of the Switch Matrix. These two switches are connected directly to the interrupt input pins of the processor.

**All of the other logic switches** are part of the Switch Matrix. (The Game Option Switch and the Handicap Switch are not connected to the processor inputs as are the other members of the Switch Matrix. A separate 4-bit port is devoted exclusively to receiving the inputs from these two switches and it should further be noted that these two switches **are not** momentary ~~connect~~ type.)  
contact



## MATRIX SECTION

Three types of problems are likely to be encountered that are associated with the Switch Matrix.

1. **A single switch in the Playfield or Pit Boss Control Panel that does not appear to perform its assigned function, such as: Rollover Switch does not score.**

This is almost certain to be a defective, dirty or misadjusted



switch or possibly a broken wire leading to the switch in question. (See Owner Manual, Maintenance Section).

**2. Score Display lights, showing all 0's when the machine is turned on, but not responding to the Start button.** *(Any permanent closure of any normally opened switch in the Switch Matrix will inhibit the detection of all switch closures, including the Start button.)* To check for defective start button, jump across the Start button terminals with a test lead and check for broken wires leading to the Start button. If this possibility is eliminated, the problem is then due to one or more of the normally opened switches on the Playfield, Pit Boss Control Console or the Tilt Switch being closed. If this problem is suspected, it can be isolated to either a malfunction in the Playfield or in the logic circuit. To determine where the problem lies, use the following procedure:

- a. Turn off the power.
- b. Disconnect the Playfield harness connectors C1 and C4 to the logic PC board.
- c. Turn on the power.
- d. Press the Start button.

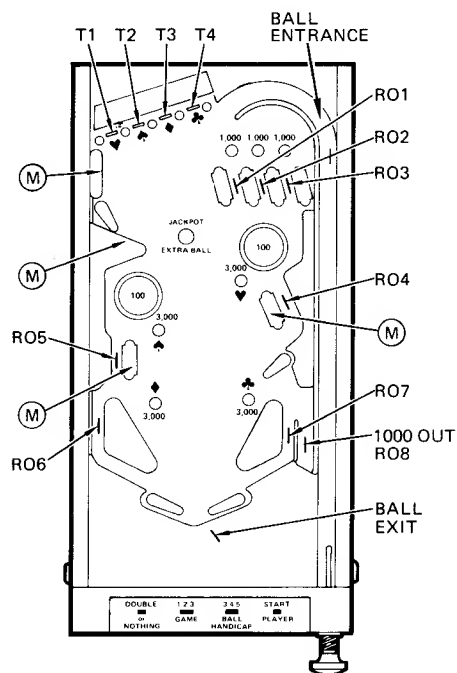
If the game then starts normally, the permanently closed switch is in the Playfield and may be isolated by normal continuity testing. If not, then the permanently closed switch is in the Pit Boss Control Console (Start button, Double or Nothing Switch) or it is in the Tilt Switch. These should be checked with power off and the Pit Boss Control Console disconnected from the logic board (C2).

**3. Several switches don't perform their intended functions (or possibly the Start button will not function after the test in Step 2 above has been performed.** This problem is due to one or more of the strobe inputs to the Switch Matrix missing, or one or more of the return paths from the Switch Matrix being defective. As further isolation requires extensive test equipment, make sure that there are no broken wires or dislodged connections anywhere in the Cabinet or Playfield. Then replace the logic PC board

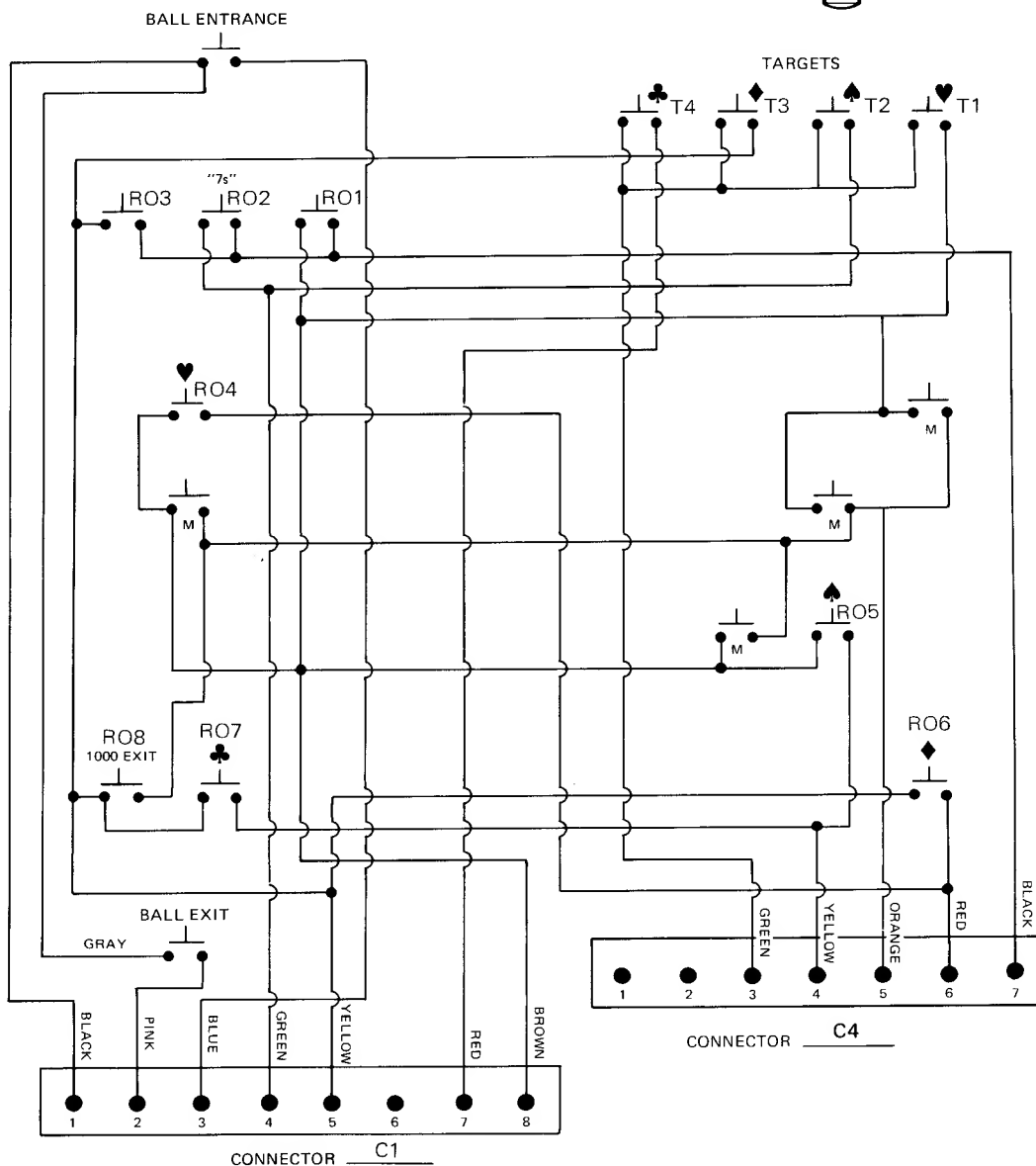
TARGETS				
T1 ♥	"M"s (4)	♠ R05	♥ R04	"7"s R01
T2 ♠	THUMPER BUMPER SLINGSHOT	TILT		R02
T3 ♦	1000 OUT R08	♣ R07	♦ R06	R03
T4 ♣	D/N DOUBLE OR NOTHING	START		



# PLAYFIELD SWITCH LOCATIONS



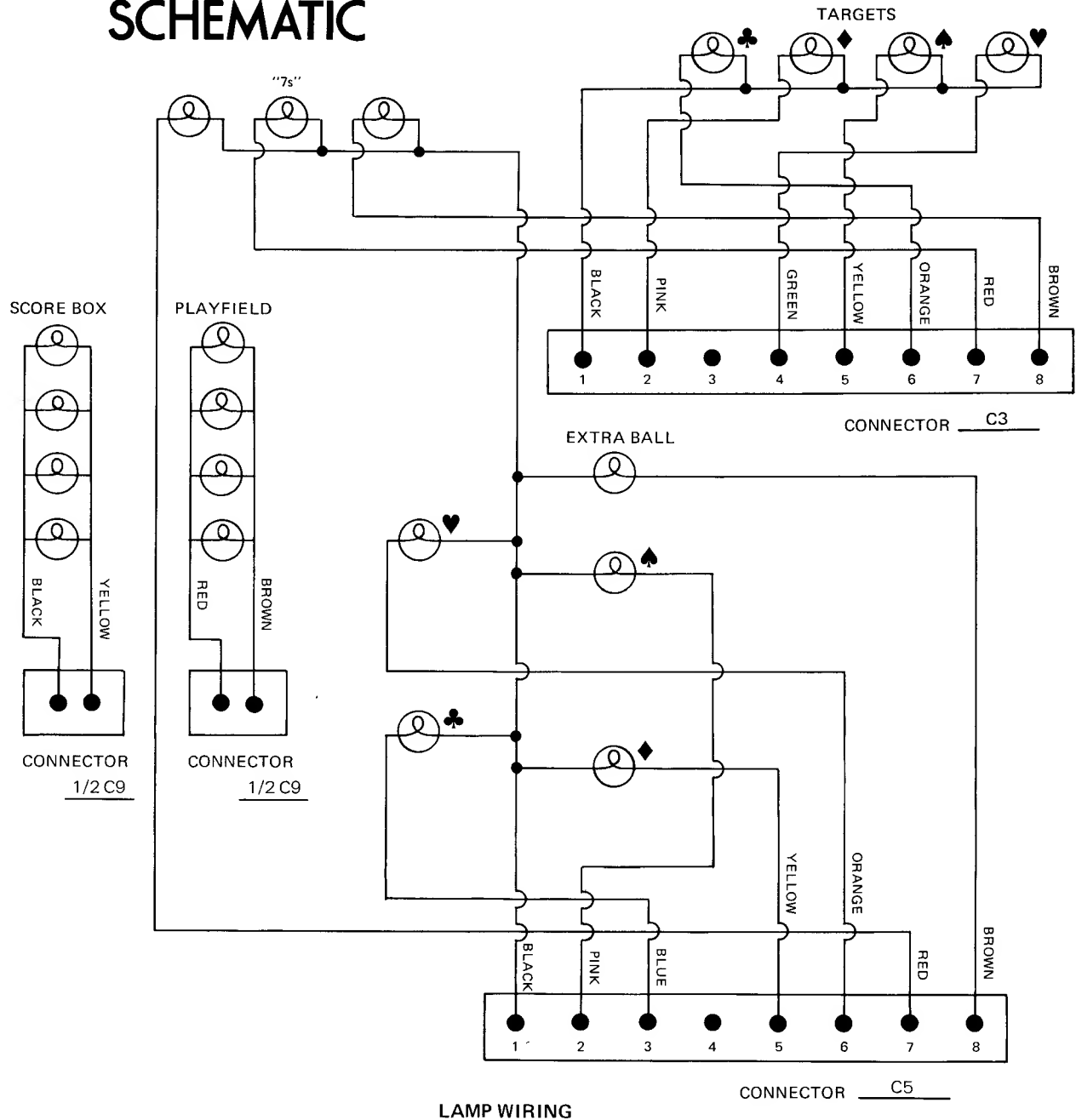
# PLAYFIELD SWITCH WIRING



# VI. LAMP WIRING

Playfield lamps are driven by the logic board. Therefore, any scoring lamp problem that cannot be traced to a lamp, socket or wiring will require replacement of the logic board.

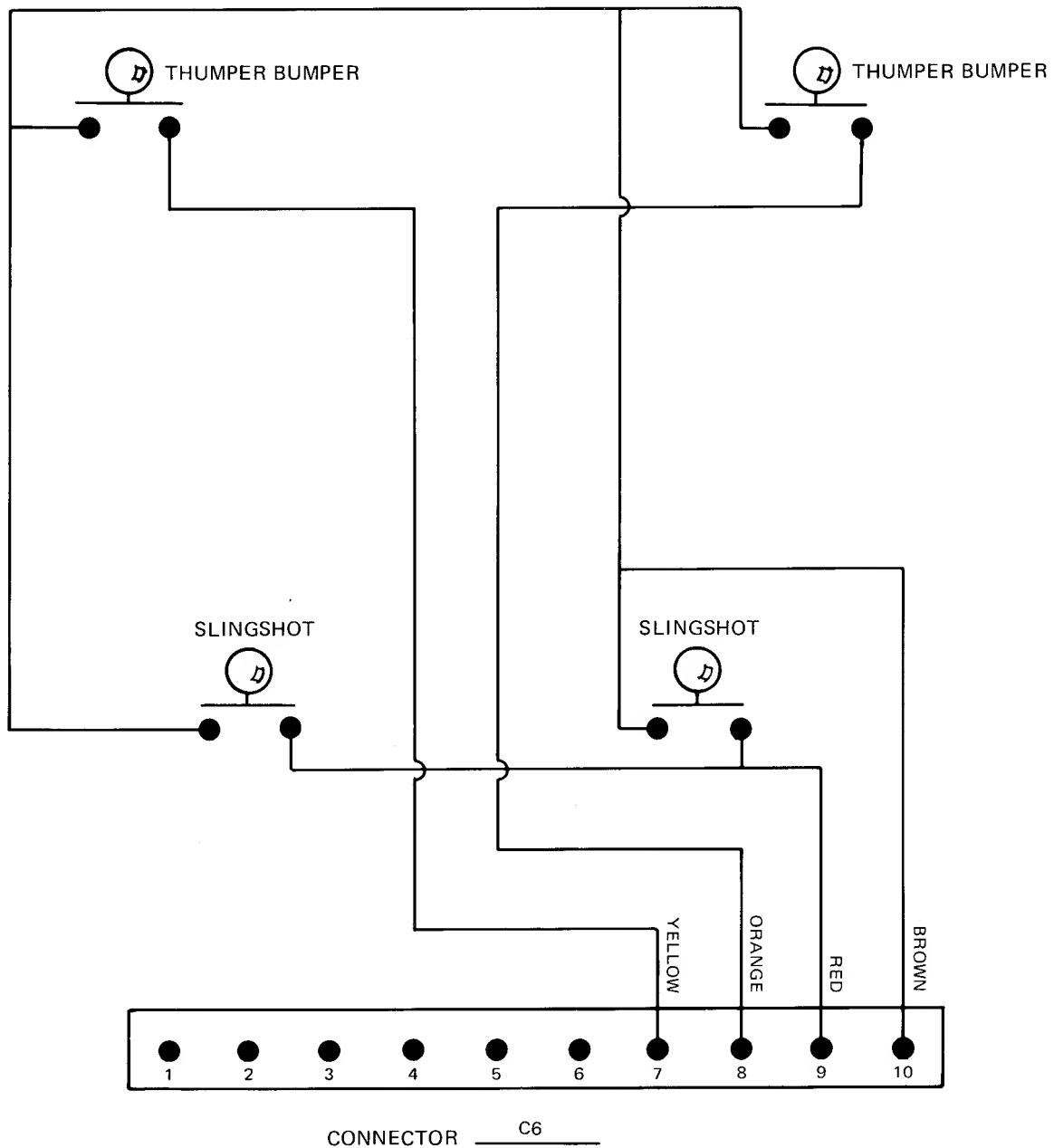
## LAMP WIRING SCHEMATIC



## VII. SOLENOID SWITCH WIRING

Scoring solenoids (Thumper Bumper and Slingshot) are driven by Darlington transistors mounted on the logic board with the function to score and “turn on” these transistors accomplished by the ball activated switches. The replacement of these transistors via logic board replacement is required when the solenoid coil has been replaced and proper operation still cannot be accomplished.

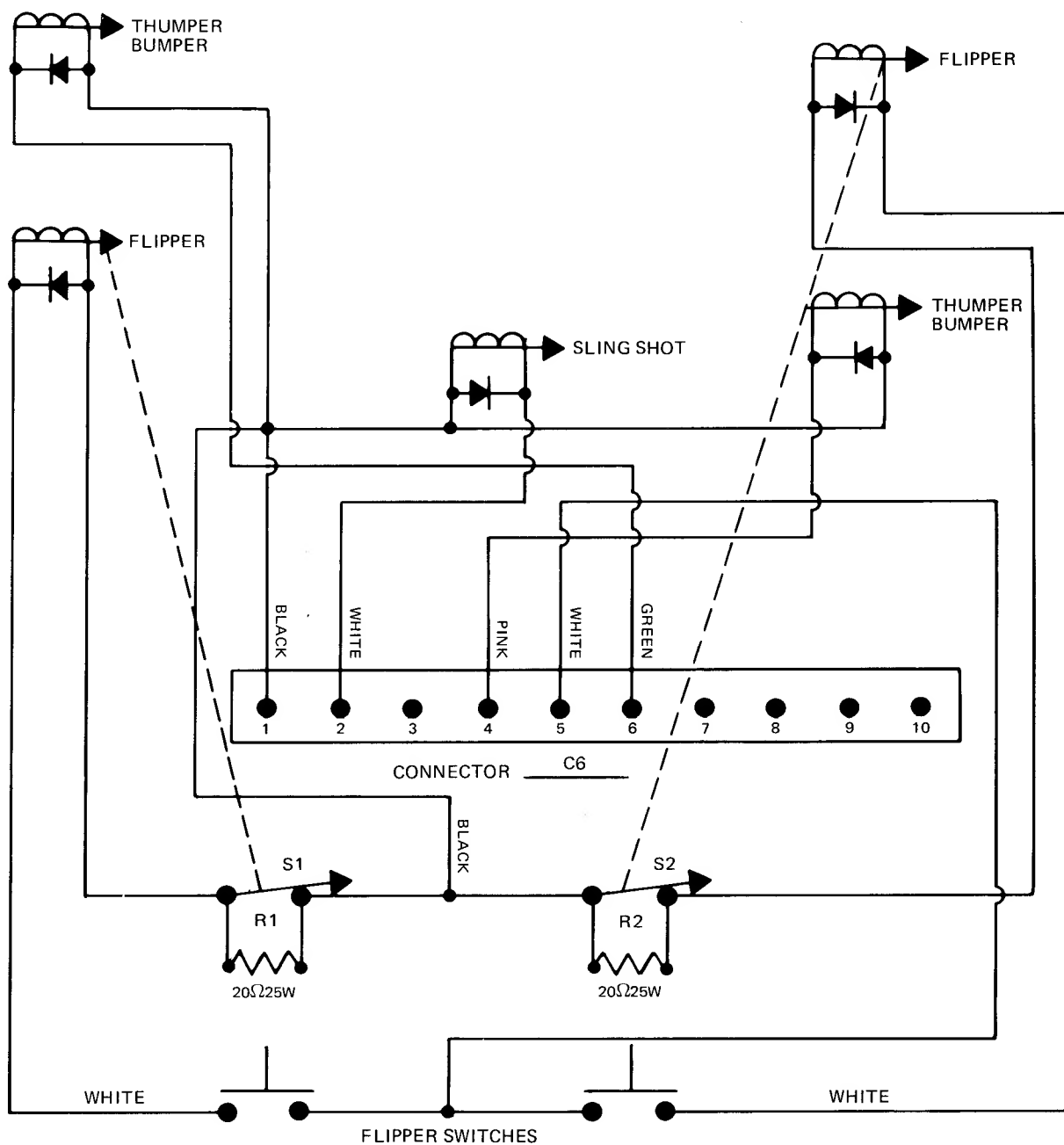
### SOLENOID SWITCH WIRING (Ball activated) SCHEMATIC



## VIII. SOLENOID WIRING

The Flipper solenoids, since they do not score, are operated directly from the 34v supply. Resistor #R1 or #R2 is inserted in series with the solenoid coil via Switch #S1, S2 when the solenoid is at the end of its stroke to prevent excessive current draw and overheating of solenoid.

### SOLENOID WIRING SCHEMATIC



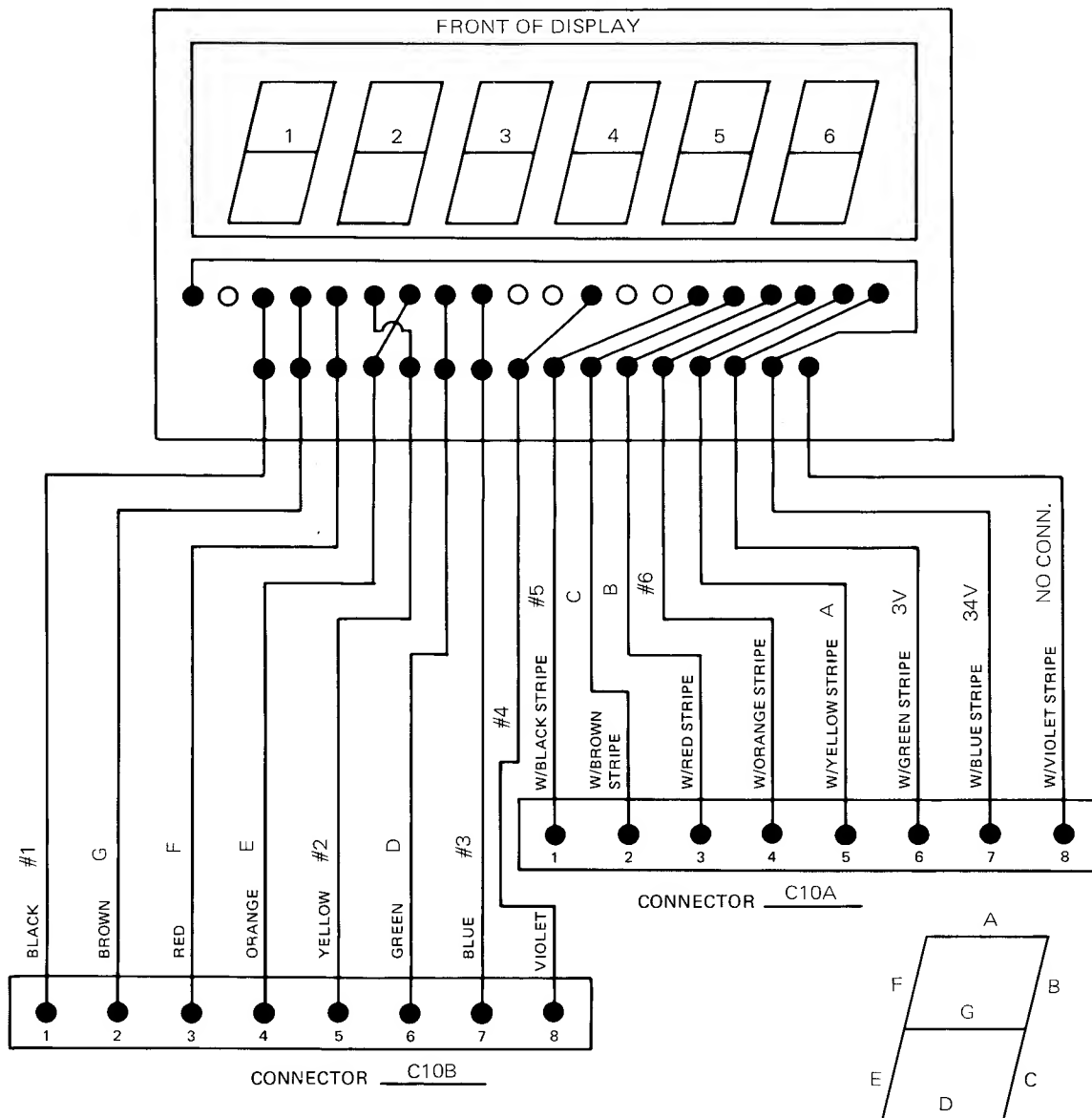
## IX. SCORE DISPLAY SECTION

The game score is displayed using an array of vacuum fluorescent digits, operating at a voltage of 34v. If the numerals on the display are missing segments, it could be due to a bad display itself or wrong information being fed into it.

If one or more of the numerals are completely blanked out, then either the connection between the display driver and the digit is defective, Connectors C10A, C10B, or the 10934 display driver chip is defective, necessitating replacement of the logic board.

If one particular segment of the display is missing on **all** the numerals, then that line should be followed backwards to isolate the problem.

## SCORE DISPLAY WIRING SCHEMATIC



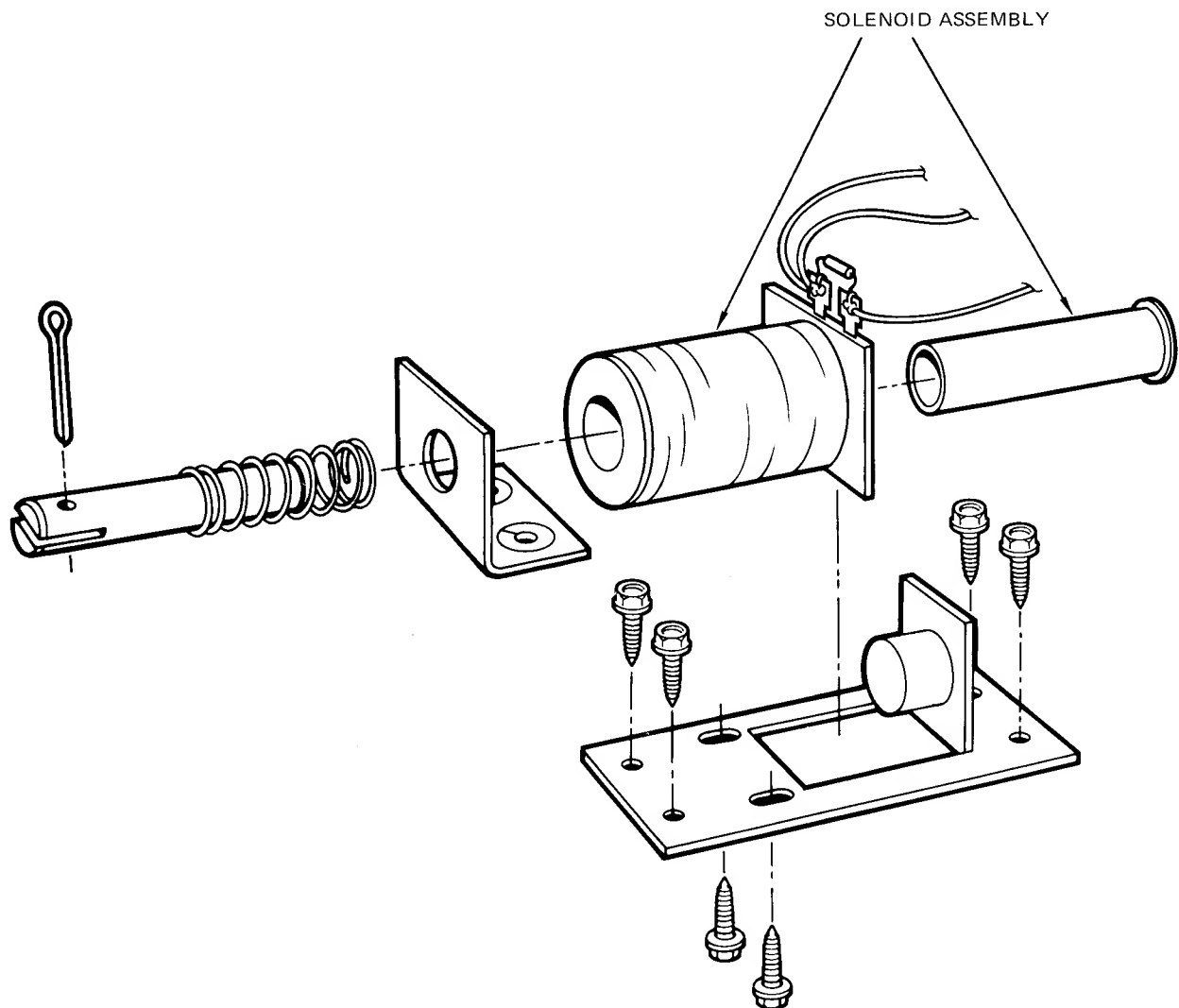
## X. SOUND

Check wiring to the Sound Level Switch. Also check logic board, switch wiring from logic board, Connector **C8** to Speaker, wiring to the sound speaker and the Speaker itself.

## XI. TROUBLE SHOOTING GUIDE

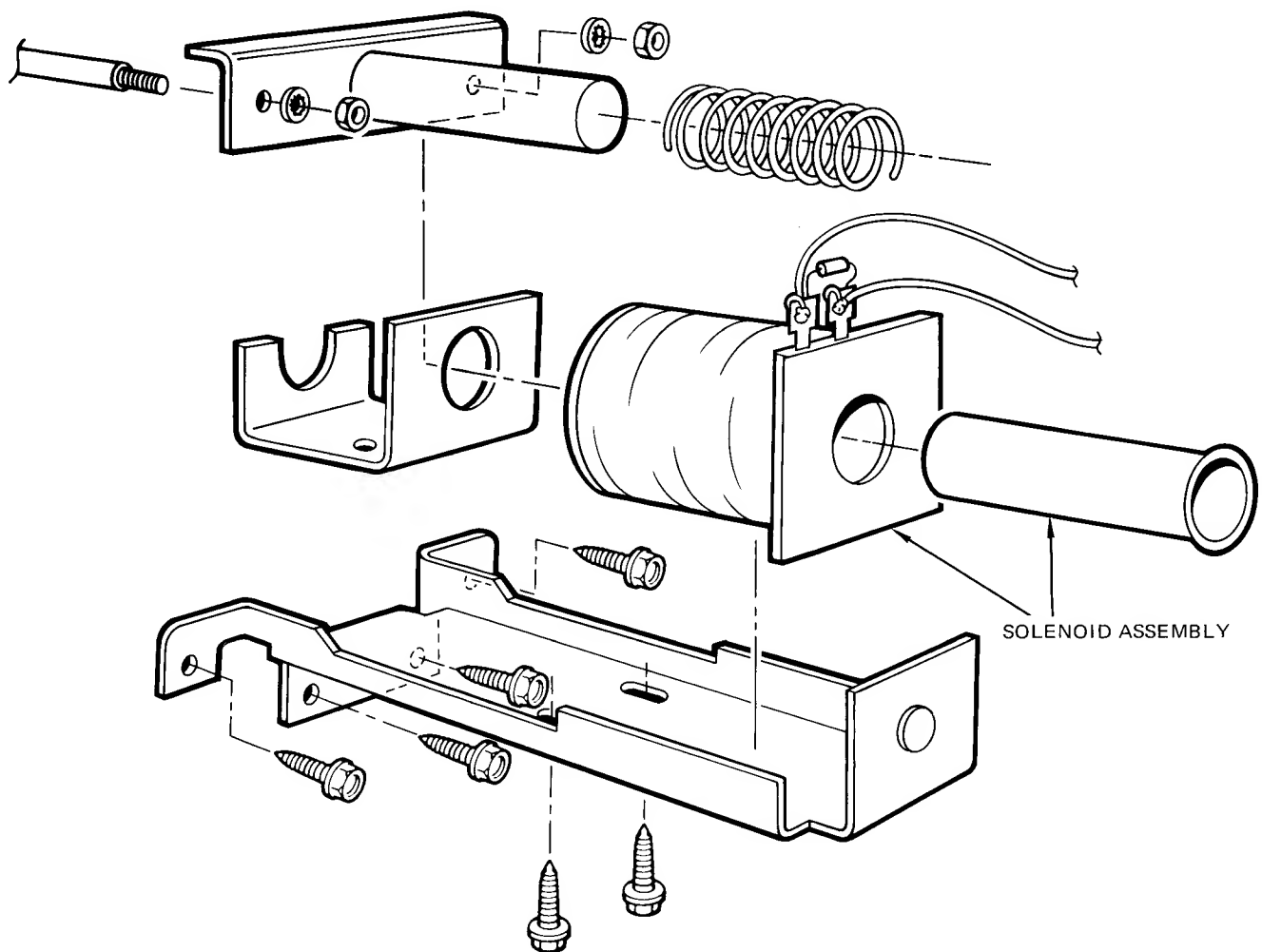
Unit will not light	<ul style="list-style-type: none"><li>a. Breakers</li><li>b. Connector #C5 loose or disconnected</li><li>c. Broken wiring in Playfield</li><li>d. AC cord</li><li>e. Power transformer</li><li>f. Power switch</li><li>g. Logic Board</li></ul>
No Start tune	<ul style="list-style-type: none"><li>a. Shorted tilt</li><li>b. Shorted / misadjusted Rollover switch</li><li>c. Pit Boss connector loose or disconnected</li><li>d. Shorted Double or Nothing</li><li>e. Broken Start switch</li><li>f. Wiring to Pit Boss</li><li>g. Logic board</li></ul>
No scoring or No bonus total	<ul style="list-style-type: none"><li>a. Misadjusted Rollover, Ball Entrance or Ball Exit</li><li>b. Connector #C1</li><li>c. Broken wiring to Rollover, Ball Entrance or Ball Exit</li><li>d. Logic Board</li></ul>
Display does not light	<ul style="list-style-type: none"><li>a. Breaker</li><li>b. Connector #C10 or #C10B or wiring</li><li>c. Display</li><li>d. Logic board</li></ul>
Flippers do not operate	<ul style="list-style-type: none"><li>a. Connector #C6</li><li>b. Breaker</li><li>c. Wiring to Flipper switches</li><li>d. Wiring from Flipper switches to Solenoid</li><li>e. Open Switches #S1 and #S2</li><li>f. Open Solenoids</li><li>g. Logic board</li></ul>
Thumper Bumpers or Sling Shots do not work	<ul style="list-style-type: none"><li>a. Connector #C6</li><li>b. Breaker</li><li>c. Broken wire to contacts or spring</li><li>d. Logic Board</li></ul>
Bonus Lamps or Target Lamps do not work	<ul style="list-style-type: none"><li>a. Switches #T1, T2, T3, T4</li><li>b. Rollovers #R01, R02, R03</li><li>c. Connector #C3 or #C5</li><li>d. Wiring to Lamps</li><li>e. Logic board</li></ul>

## XII. FLIPPER and SLINGSHOT SOLENOID DISSASSEMBLY

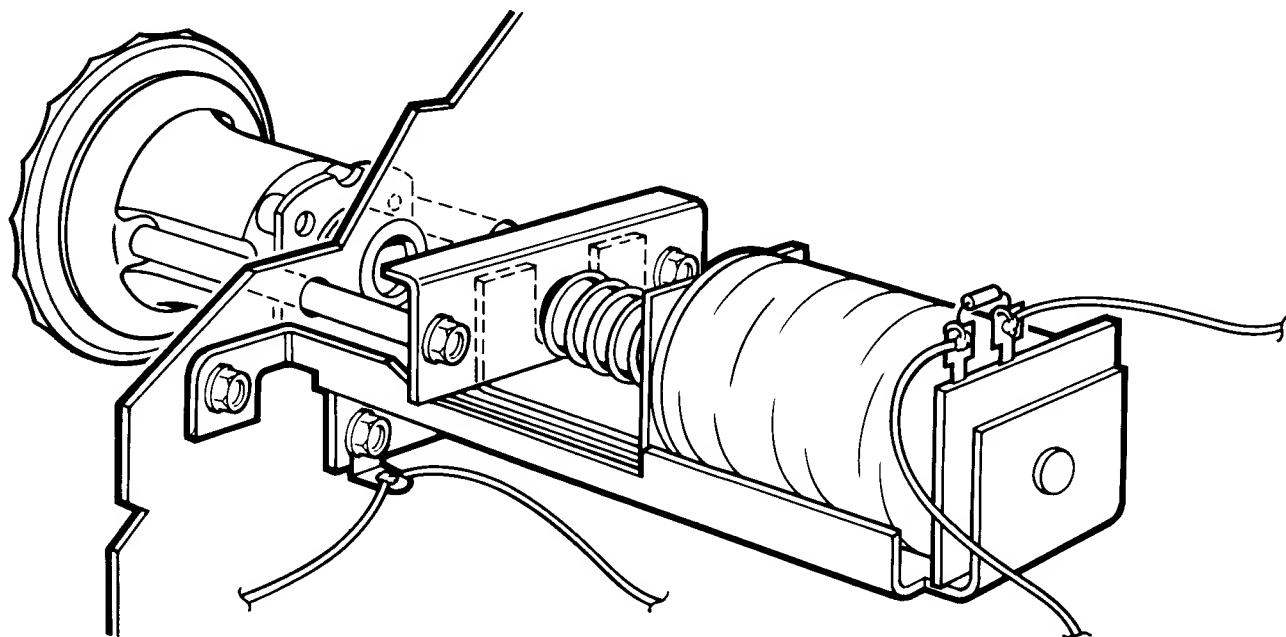




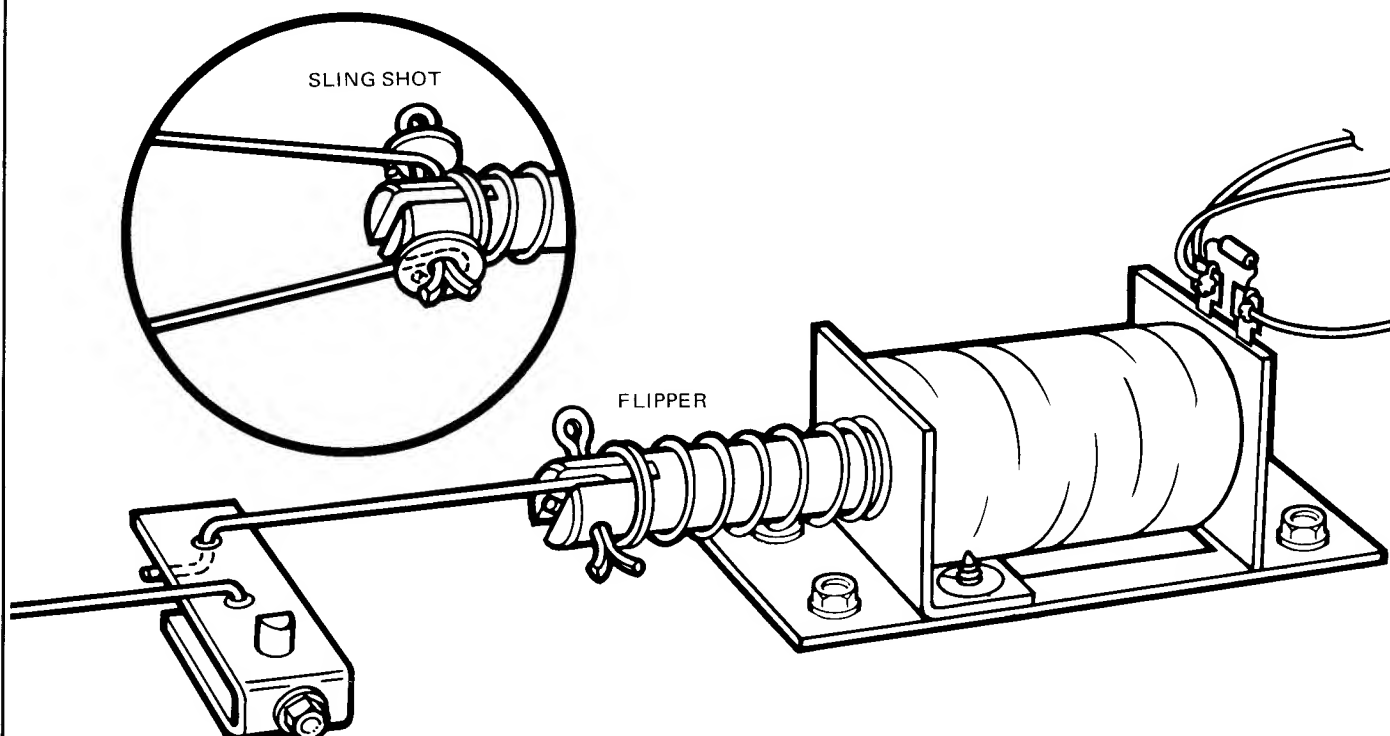
# THUMPER BUMPER DISSASSEMBLY



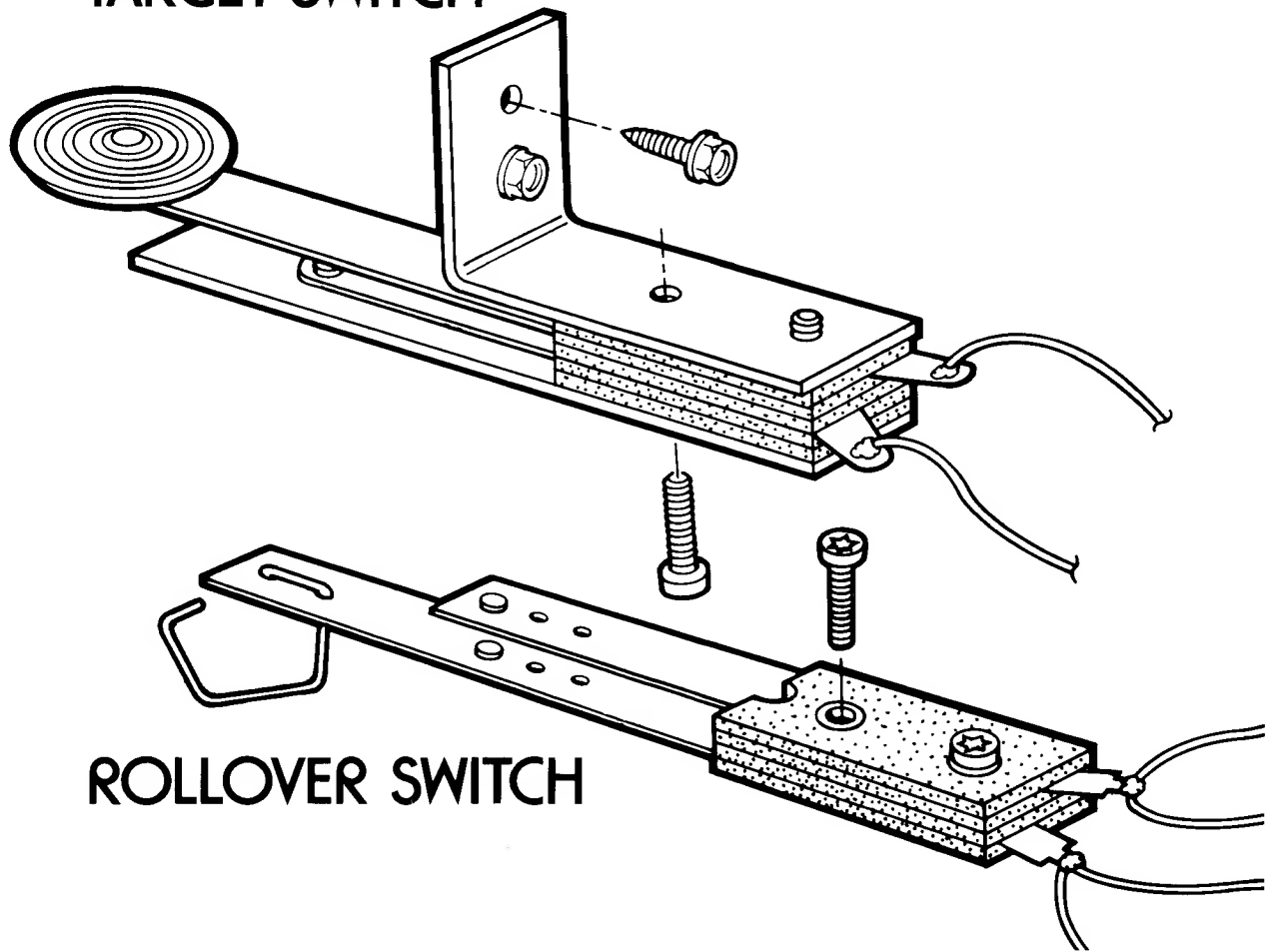
## THUMPER BUMPER, COMPLETE



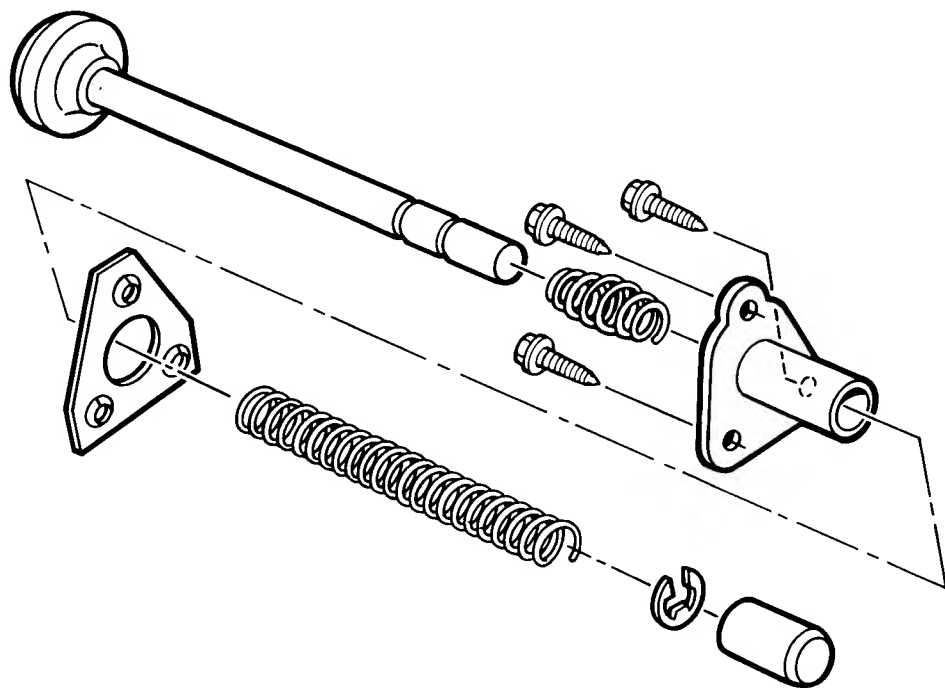
## FLIPPER and SLINGSHOT, COMPLETE



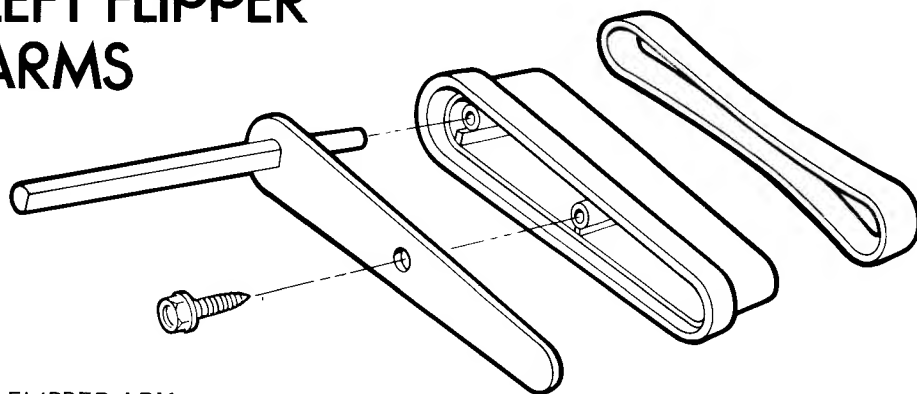
## TARGET SWITCH



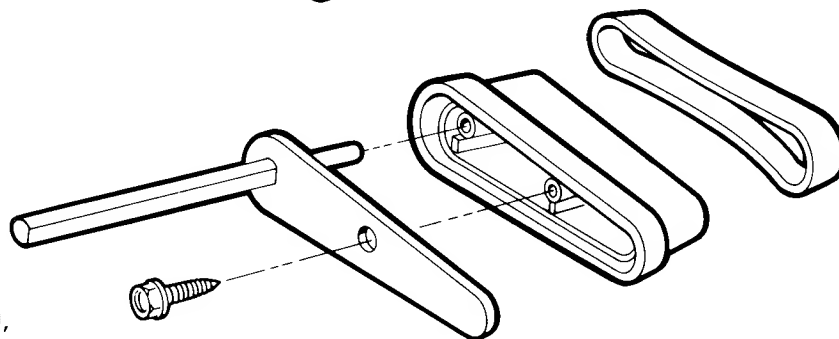
## SHOOTER ASSEMBLY



## LEFT FLIPPER ARMS



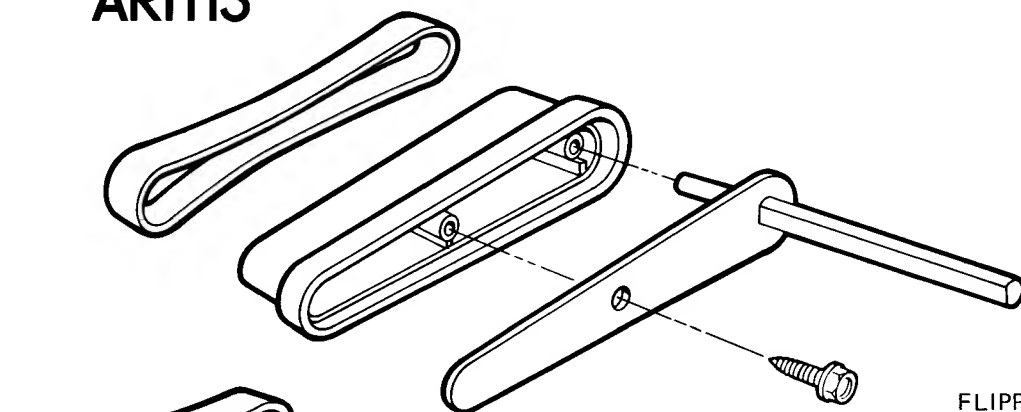
FLIPPER ARM,  
BOTTOM



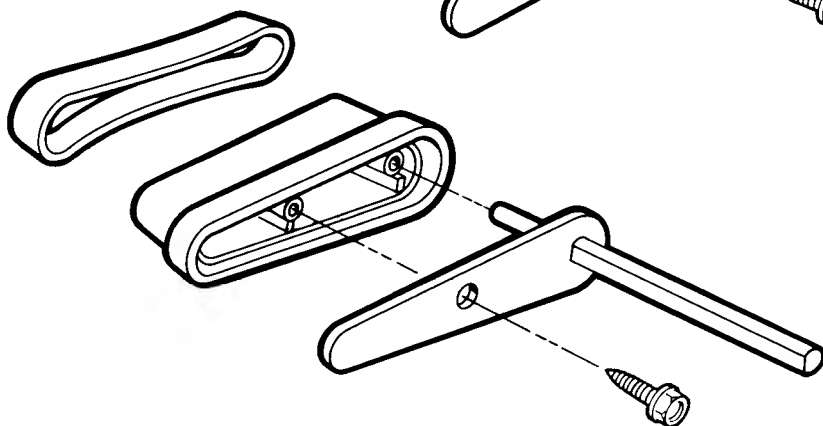
FLIPPER ARM,  
TOP

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## RIGHT FLIPPER ARMS



FLIPPER ARM,  
BOTTOM



FLIPPER ARM,  
TOP

# **XIII. LAS VEGAS PINBALL GAME SERVICE PARTS**

<b>GE P/N</b>	<b>Part</b>
A.	
WT10X1	Transformer (w/connectors)
WT10X2	SW Plate Assy (w/connectors)
WT10X3	Logic Board (complete/tested)
WT10X4	AC Cord
B.	
WT10X5	Speaker
WT10X6	Speaker Harness (w/connectors)
WT10X7	Tilt SW Assy
WT10X8	Flipper SW (button)
C.	
WT10X9	Leg
WT10X10	Leg Bolt
WT10X11	Leveler
WT10X12	Ball
WT10X13	SW Adjust Tool
D.	
WT10X14	Display (w/harness and connectors)
WT10X15	Wooden Display Panel Retainer Molding
WT10X16	Score Box Display Panel
E.	
WT10X17	Pit Boss (complete with harness)
WT10X18	Push SW
WT10X19	3-position SW
WT10X20	Shooter Assy
WT10X21	Inlay Pit Boss
F.	
WT10X22	Playfield (operational)
WT10X23	Lamp Socket (on strap)
WT10X24	Lamp Socket (on strap)
WT10X25	Target SW Assy
WT10X26	Rollover SW Assy
WT10X27	Solenoid Assy (includes nylon insert)
WT10X28	Flipper Bypass SW Assy
WT10X29	Power Resistor (Flipper)
WT10X30	Thumper Bumper Assy

“F” CONTINUED NEXT PAGE

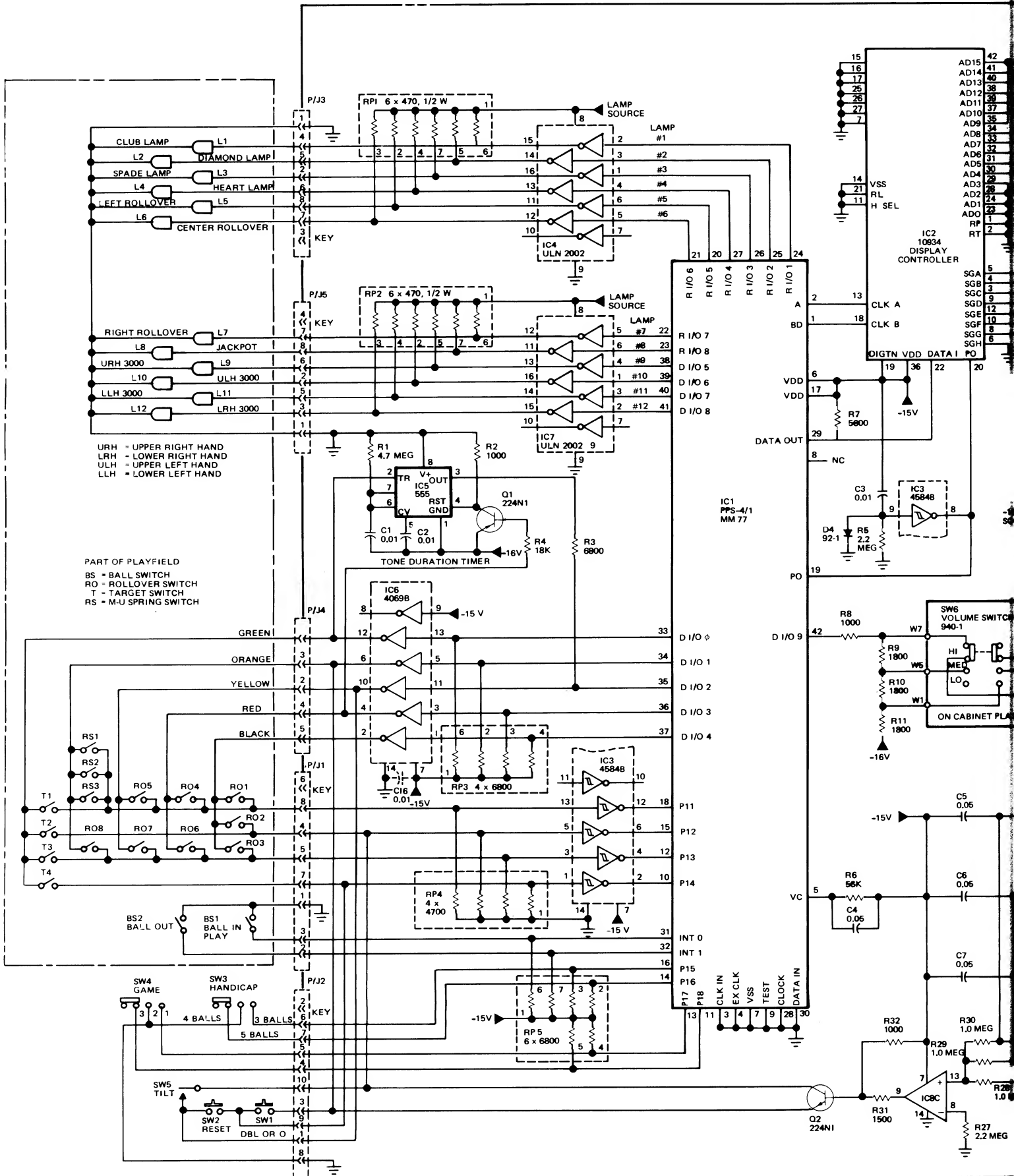
GE P/N	Part
F. (continued)	
WT10X31	Flipper Assy (Solenoid)
WT10X32	Pull Rods/Linkages (Flippers)
WT10X33	Pull Rods Linkages (Sling Shot)
WT10X34	Sling Shot Assy
WT10X35	Plexiglass Window "1,000's"
	Plexiglass Island
	Plexiglass Island
	Plexiglass Island
	Plexiglass Island
	Plexiglass Island
	Plexiglass Island
	Plexiglass Cover
	Tip (nylon insert)
	"M"SW (2 parts)
	Ball Entry Gate
	Flipper Arm Assy Top Rt
	Flipper Arm Assy Top Lft
	Flipper Arm Assy Bottom Rt
	Flipper Arm Assy Bottom Lft
	Thumper Bumper Cover
	Thumper Bumper Body
	Sling Shot Rebound Spring

Kit of 3 each

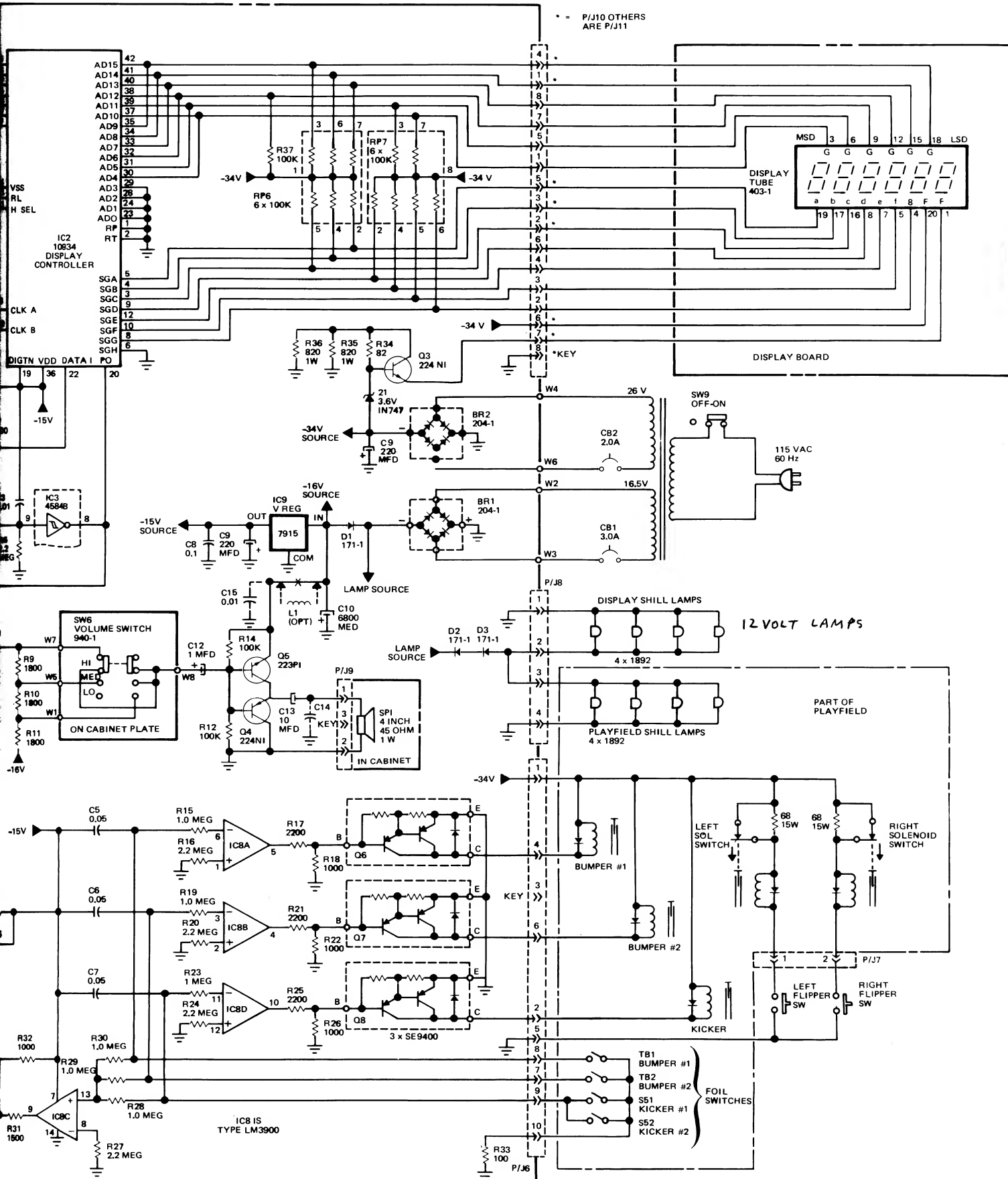
#### Misc.

WT10X36	Rubbers and Bulbs Kit (5 each of all Rubbers, incl. Flipper Rubber and Shooter Tip and 6 each light bulbs)
WT10X45	Playfield Glass
WT10X46	Screw, nut, bolt, washer kit (incl. 10 each of all)
WT10X47	Connector (AMP) kit (incl. 5 each of all, insertion tool, extraction tool, 50 each connector pins)

# XIV. LAS VEGAS PINBALL™ GAME SCHEMATIC







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